COMPACT EXCAVATOR

TB015

WORKSHOP MANUAL

SERIAL NUMBER
TB015 : 1153001～

TAKEUCHI MFG. CO., LTD.
10. 99
11434

FOREWORD

This manual is intended for persons who engage in maintenance operations, and explains procedures for disassembly and reassembly of the machine, check and maintenance procedures, maintenance reference values, troubleshooting and outline specifications, etc. Please use this manual as a reference in service activities to improve maintenance techniques.
Further, please be adviced that items contained in this manual are subject to change without notice due to design modifications, etc.

MACHINE FRONT AND REAR, LEFT AND RIGHT

The end where the dozer blade is mounted is the front and the end with the travel motors is the rear. Also the right and left sides of the operator when he is seated in the driver's seat are the right and left sides of the machine.

MACHINE SERIAL NUMBER

The machine serial number is stamped on the identification plate. When sending reports and inquiries, and when ordering parts, etc., be sure to include this number.

MANUAL CONTROL

Information on those to whom this manual is distributed is recorded in the ledger in the section in charge at this company, so please decide on a person to be in charge of it and control it. When there are updates or additions, etc., we will notify the person in charge.

I. GENERAL

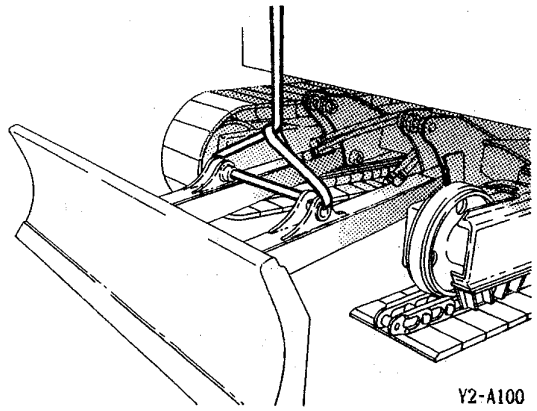
FOREWORD

This section, GENERAL, summarizes the basic items which persons servicing the machine should be cautious about, and includes only those items which are essential for safe and correct operation. Please read this section thoroughly and apply it in maintenance operations.
Further, since the contents of this manual may change due to future revisions, if you have any opinions or observations concerning this manual, please notify the person responsible.

CONTENTS

GENERAL CAUTIONS

1. Wear a helmet, safety shoes and work clothes.
2. Be sure to check equipment and tools, particularly equipment used for hoisting.
3. If more than one person is working together, decide the job and call sign and maintain good communications during operations.
4. Crane operation and hoisting should be done by persons with the proper qualifications.
5. Keep all persons from getting underneath a suspended load.
6. Before removing the installation bolts of heavy parts, support the parts by temporary hoisting a crane.



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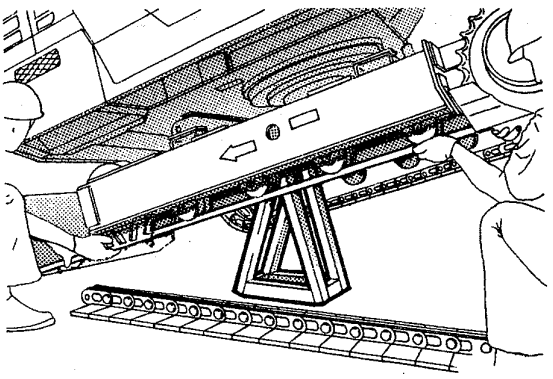
7. If lifting a machine with a hoe attachment, etc. and going underneath it, be sure to supprt it with stands etc.



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8. When repairing the electrical system, disconnect the cables from the battery before beginning the operation.
9. When welding the machine, disconnect the battery first.
10. Maintain the standard tightening torques for piping and bolts, etc.
11. After completing repairs, run the engine at low speed, and conduct trial operation after filling it full with operating oil.

CAUTIONS DURING DISASSEMBLY AND ASSEMBLY

1. Clean the machine before disassembly operation.

2. Before disassembly, check the machine conditions and record them.
   - Model, Machine Serial Number, Hourmeter
   - Reason for Repairs, Repairs History
   - Dirtiness of Filters
   - Fuel and Oil Conditions
   - Damage to each parts, etc.

3. To make reassembly operations easy, make matching marks at the necessary points.

4. Clean all disassembled parts and new parts, then arrange them in the proper sequence.

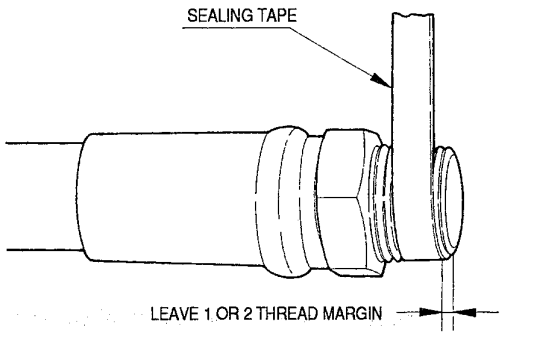
5. Be sure to replace all seals and cotter pins, etc. with new parts.

6. Keep parts which should not come in contact with oil and water separate from parts with oil on them.
   - Electrical Parts, Rubber, V-Belts, etc.

7. When installing bearings, bushings and oil seals, as a rule, use a press. When a hammer, etc. is used, it leaves bruises.

8. Wipe all joining surfaces clean so that there is no dirt or dust adhering to them.

9. Wrap seal tape from the front end, Wrapping it tight and leaving 1 or 2 threads bare, Overlap the tape by about 10mm.

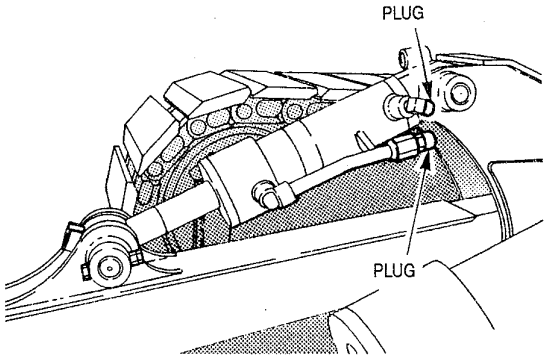


CAUTIONS DURING REMOVAL AND INSTALLATION OF THE HYDRAULIC UNITS

1. Make sure that the hydraulic oil's temperature has dropped.

2. To prevent a loss of flow of the hydraulic oil, the residual pressure in the piping and the internal pressure in the hydraulic oil tank should be bled out.

3. Be sure to install caps or plugs on all openings in the hydraulic unit to prevent dirt from getting into the unit throught the openings.



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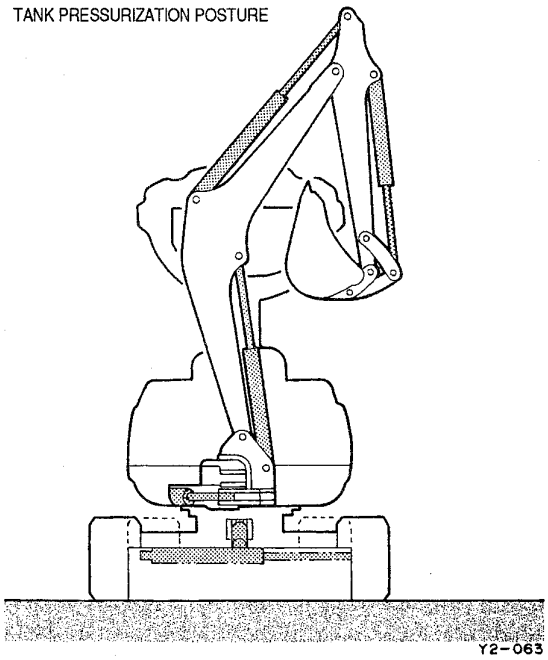
4. It is easy to mistake hydraulic oil adhering to the hydraulic unit for an oil leak, so wipe the unit off thoroughly.

5. Be sure that no damage is done to the plating on the rod in the hydraulic cylinder.

6. As a rule, removal and installation of the hydraulic cylinder should be done with the rod fully retracted.

7. When removing and installing the hydraulic cylinder, be sure to bleed out the air.
   (See the item in "IV. Hydraulic Units, Cylinder".)

8. After installation of the hydraulic unit, be sure to pressurize the hydraulic oil tank. If this operation is forgotten, it could cause cavitation of the hydraulic pump. Also, it could have a drastic effect on the life of the hydraulic pump.
   - Hydraulic tank pressurization method:
     Lower the dozer blade until it comes in contact with the ground. Extend all the cylinders fully except the dozer blade cylinder. In this state, tighten the air vent plug to seal the tank tight.



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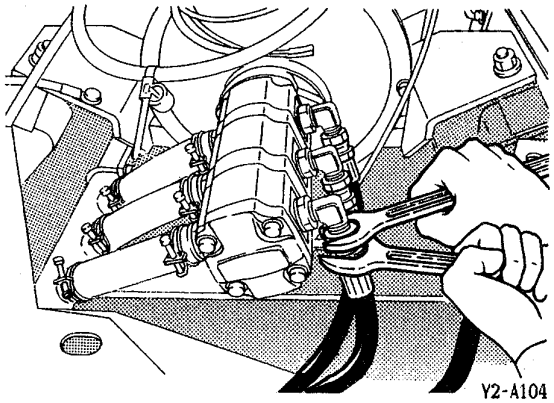
CAUTIONS DURING REMOVAL AND INSTALLATION OF PIPING

1. When hydraulic hoses are installed, tighten them once to the prescribed torque, then loosen them slightly and retighten them to the prescribed torque.
   - Tighten the fittings after the installation surfaces fit snugly together.
   - Pieces wrapped with seal tape are exlcuded.

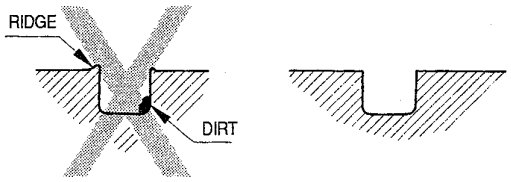
2. Use 2 spanners, each on an opposit side, to remove and tighten fittings so that the hoses or steel pipes are not twisted.



3. After installation of hydraulic hoses or steel pipes, apply the maximum working pressure 5 or 6 times and confirm that there is no leakage.

HANDLING OF SEALS

1. Clean the grooves for O-rings and if there is any ridge, etc, remove it.



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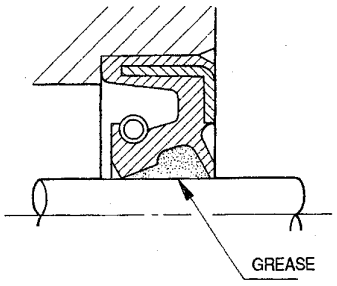
2. Be careful not to twist O-rings. If an O-ring is twisted, remove the twist with the fingertips.

3. During insertion, be careful not to damage the seal.

4. Handling of Floating Seals
   - Wipe all oil off the O-ring and housing of the floating seal.
   - When assembling, apply a thin coating of gear oil to the contact surface of the housing.
   - After assembly, turn the seal 2 or 3 times to get it to fit snugly.

5. Apply grease to the lip of the oil seal.
   - This is to prevent wear when it is first started up after assembly.



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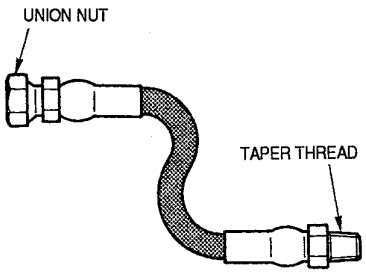
TIGHTENING TORQUES

Hydraulic Hoses

Hose Fitting Size	Torque			
	Union Nut (PF)		Taper Thread (PT)	
	kgf·m	ft-lb	kgf·m	ft-lb
1/8	$1.0^{+0.5}_{0}$	$7.3^{+3.5}_{0}$	1.2±0.12	8.7±0.8
1/4	$2.5^{+0.5}_{0}$	$18.1^{+3.5}_{0}$	3.0±0.30	21.7±2.1
3/8	$5.0^{+0.5}_{0}$	$36.2^{+3.5}_{0}$	5.5±0.55	39.8±3.9
1/2	$6.0^{+0.5}_{0}$	$43.4^{+3.5}_{0}$	9.0±0.90	65.1±6.4
3/4	$12.0^{+0.5}_{0}$	$86.8^{+3.5}_{0}$	15.0±1.50	108.5±10.7
1	$14.0^{+0.5}_{0}$	$101.3^{+3.5}_{0}$	20.0±2.00	144.7±14.3



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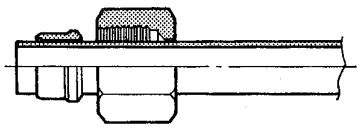
Bite Type Pipe Fitting for Steel Pipe

Pipe Outer Diameter (mm)	Torque	
	kgf·m	ft-lb
8	3.5±0.5	25.3±3.5
10	4.25±0.25	30.7±1.7
12	6.0±0.5	43.4±3.5
15	9.0±0.5	65.1±3.5
16	9.5±0.5	68.7±3.5
18	13.5±0.5	97.6±3.5
22	21.0±1.0	151.8±7.2
27.2	25.0±1.0	181.0±7.2
28	32.0±2.0	231.4±14.3
32	32.0±2.0	231.4±14.3
35	42.0±2.0	303.7±14.3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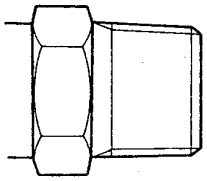
Joints for Piping

Thread Nominal Diameter (PT)	Torque			
	Steel		Cast Steel	
	kgf·m	ft-lb	kgf·m	ft-lb
1/8	1.2±0.12	8.7±0.8	1.1±0.11	8.0±0.7
1/4	3.0±0.30	21.7±2.1	2.5±0.25	18.1±1.7
3/8	5.5±0.55	39.8±3.9	5.0±0.50	36.2±3.5
1/2	9.0±0.90	65.1±6.4	7.5±0.75	54.3±5.3
3/4	15.0±1.50	108.5±10.7	13.0±1.30	94.1±9.3
1	20.0±2.00	144.7±14.3	17.5±1.75	126.6±12.5



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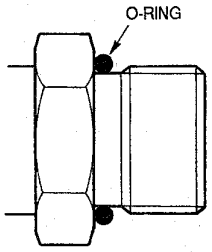
Joints for Piping (O-ring Seal Type)

Thread Nominal Diameter (PT)	Torque	
	kgf·m	ft-lb
1/8	2.0±0.2	14.5±1.4
1/4	3.5±0.5	25.3±3.5
3/8	5.5±0.5	39.8±3.5
1/2	6.5±0.5	47.0±3.5
3/4	9.5±0.5	68.7±3.5
1	11.0±1.0	79.5±7.2
1-1/4	12.0±1.0	86.8±7.2
1-1/2	14.0±1.0	101.2±7.2



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Thread Nominal Diameter (UNF)	Torque	
	kgf·m	ft-lb
7/16—20	1.7±0.2	12.3±1.4
1/2—20	2.3±0.2	16.6±1.4
9/16—18	3.2±0.3	23.1±2.1
3/4—16	6.1±0.5	44.1±3.5
1-1/16—12	10.4±0.6	75.2±4.4
1-5/16—12	13.8±0.8	99.8±5.8
1-5/8—12	18.5±1.0	133.8±7.2

Bolts and Nuts (for ISO Strength Category 10.9)

Thread	Size × Pitch mm	Torque					
		General Tightening Points			Special Tightening Points		
		N·m	kgf·m	ft-lb	N·m	kgf·m	ft-lb
Coarse	M6 × 1.0	9.8 ±0.5	1.0 ±0.05	7.2 ±0.4	11.8 ±0.6	1.2 ±0.06	8.7 ±0.4
	M8 × 1.25	22.6 ±1.1	2.3 ±0.11	16.6 ±0.8	26.5 ±1.3	2.7 ±0.13	19.5 ±0.9
	M10 × 1.5	47.1 ±2.4	4.8 ±0.24	34.7 ±1.7	54.9 ±2.7	5.6 ±0.28	40.5 ±2.0
	M12 × 1.75	83.4 ±4.1	8.5 ±0.42	61.5 ±3.0	97.1 ±4.8	9.9 ±0.49	71.6 ±3.5
	M14 × 2.0	134.4 ±6.7	13.7 ±0.68	99.1 ±4.9	155.9 ±7.7	15.9 ±0.79	115.0 ±5.7
	M16 × 2.0	207.9 ±10.4	21.2 ±1.06	153.3 ±7.7	241.2 ±12.1	24.6 ±1.23	177.9 ±8.9
	M20 × 2.5	410.9 ±20.5	41.9 ±2.09	303.1 ±15.1	475.6 ±23.7	48.5 ±2.42	350.8 ±17.5
Fine	M8 × 1.0	24.5 ±1.2	2.5 ±0.12	18.1 ±0.9	28.4 ±1.4	2.9 ±0.14	21.0 ±1.0
	M10 × 1.25	50.0 ±2.5	5.1 ±0.25	36.9 ±1.8	58.8 ±2.9	6.0 ±0.30	43.4 ±2.2
	M12 × 1.5	87.3 ±4.3	8.9 ±0.44	64.4 ±3.2	102.0 ±5.1	10.4 ±0.52	75.2 ±3.8
	M14 × 1.5	135.3 ±6.8	13.8 ±0.69	99.8 ±5.0	157.9 ±7.8	16.1 ±0.80	116.5 ±5.8
	M16 × 1.5	220.6 ±11.0	22.5 ±1.12	162.7 ±8.1	256.0 ±12.7	26.1 ±1.30	188.8 ±9.4
	M20 × 1.5	452.1 ±22.6	46.1 ±2.30	333.4 ±16.6	524.7 ±26.1	53.5 ±2.66	387.0 ±19.2

1. General Tightening Points (Non-lubricated)
   - All securing points other than the special tightening points.

2. Special Tightening Points (Grease with molybdenum disulfide applied.)
   - Points where particularly necessary due to function.

   a. Other parts where it is deemed particularly necessary due to the design.

3. Points where thread lock is used (Three Bond #1324 is applied.)
   a. Conections between the slew bearing and lower frame.
   b. Engine foot connections.
   c. Pump coupling connections.
   d. Counterweight tightening position.
   e. Other parts where it is deemed particularly necessary due to the design.

4. If tightening torque values are provided in this manual, then tightening should be done according to those values.
   (This indicates that the tightening torque differs from the values given in this table.)
5. In order to tighten bolts and nuts evenly, they should be tightened alternately top, bottom, left, right.

II. SPECIFICATIONS

FOREWORD

This section, SPECIFICATIONS, includes brief specifications and maintenance standards for this machine, and is organized around the data required for service operations. Please use this manual in checks of the machine before servicing, checks after servicing and when replacing parts.
We want, through future revisions of this manual, to improve it and make it as complete as we possibly can. We welcome any opinions or suggestions, which you may have that would help us. Please address all comments to the person in charge.

In regard to Standard Values and Allowable Values

The terms used in the items "Servicing Standards" and " Standards for Judging Performance" have the following meanings.

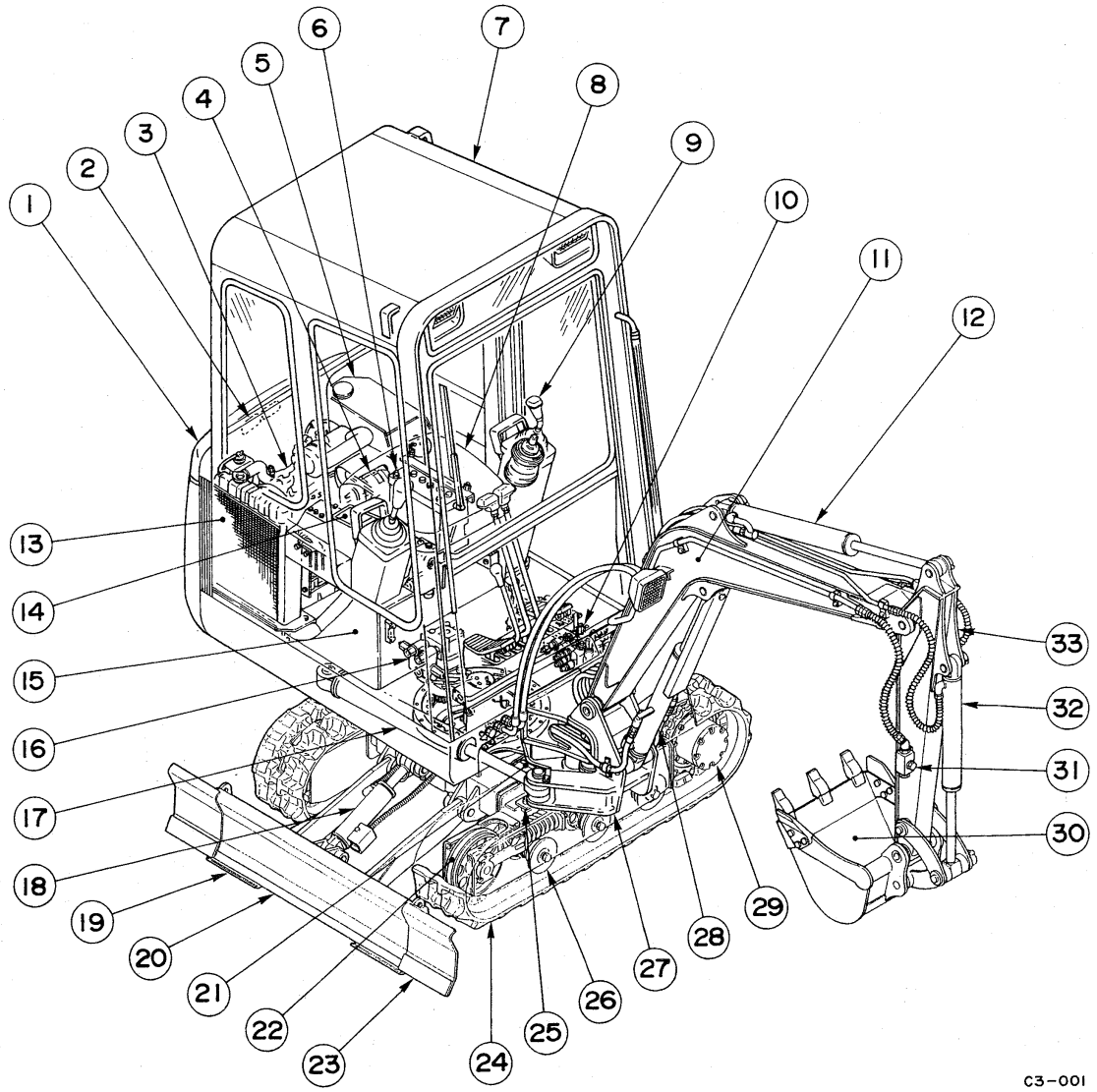
Standard Value ..... This indicates the standard value for the new machine at the time of shipping from the factory. It should be used as the target value for maintenance work after operation.

Allowable Value ..... The dimensions of parts change during use because of wear and deformation. Also, the performance of pumps, motors, and other hydraulic equipment drops, and this is the estimated value indicating the use limit for the respective part. It is decided under reference to the standard at the time of shipping, the results of various tests, etc. As the use conditions, the degree of repairs, etc. differ for each machine, these should be combined and used as reference for servicing standards and standards for judging performance.

*Do not use the standard values and the allowable values as standards for customer claims.

CONTENTS

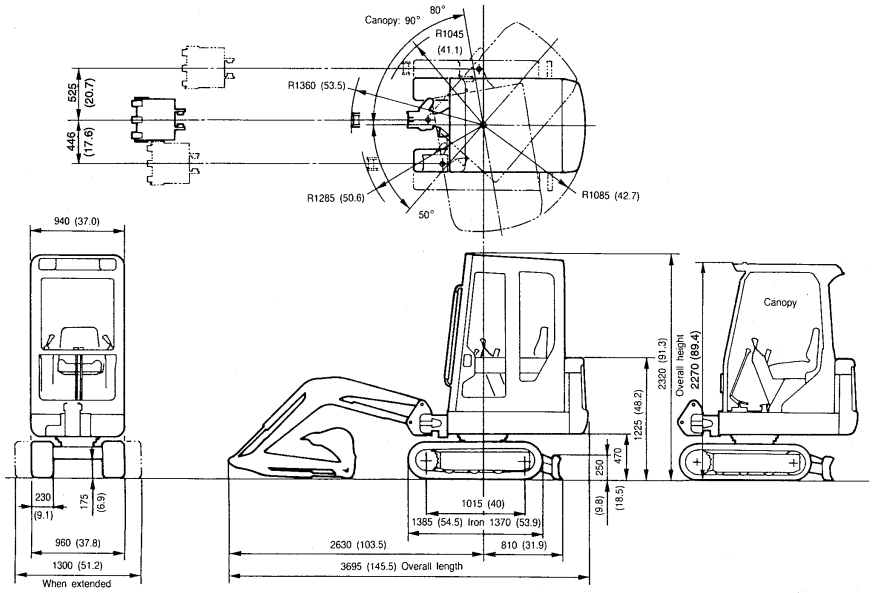
NAMES OF COMPONENTS

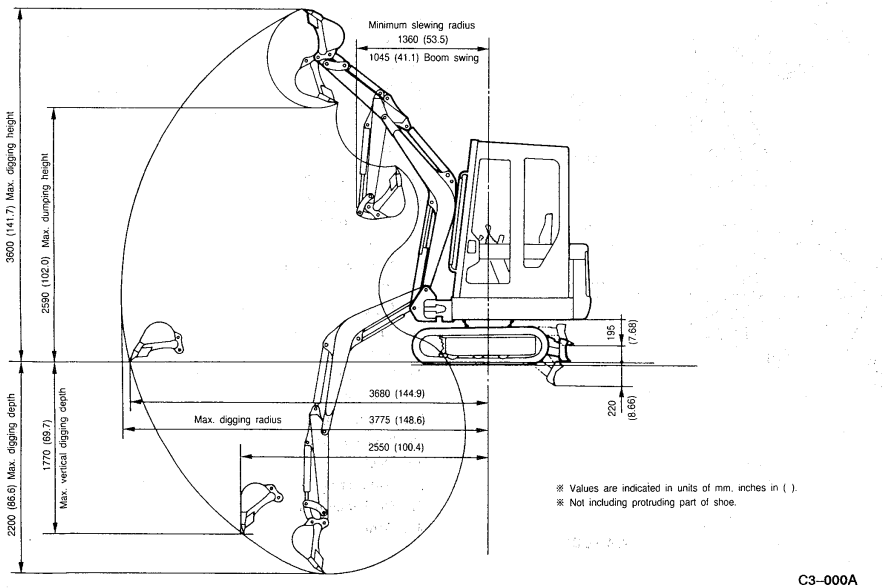


1. Bonnet
2. Flasher lamp
3. Engine
4. Hydraulic pump
5. Fuel tank
6. Battery
7. Cab
8. Seat
9. Left operating lever
10. Control valve
11. Boom
12. Arm cylinder
13. Radiator
14. Monitor
15. Hydraulic tank
16. Slew motor
17. Swing cylinder
18. Blade cylinder
19. Road protector
20. Blade
21. Spanner cylinder
22. Idler
23. Plate
24. Crawler belt
25. Slide
26. Track roller
27. Bracket
28. Boom cylinder
29. Travel motor
30. Bucket
31. Auxiliary port
32. Bucket cylinder
33. Arm

SPECIFICATION DIAGRAMS

■ Serial Number: 1153001 ~ 1153181, 1153428 ~





※ Values are indicated in units of mm, inches in ( ).
※ Not including protruding part of shoe.

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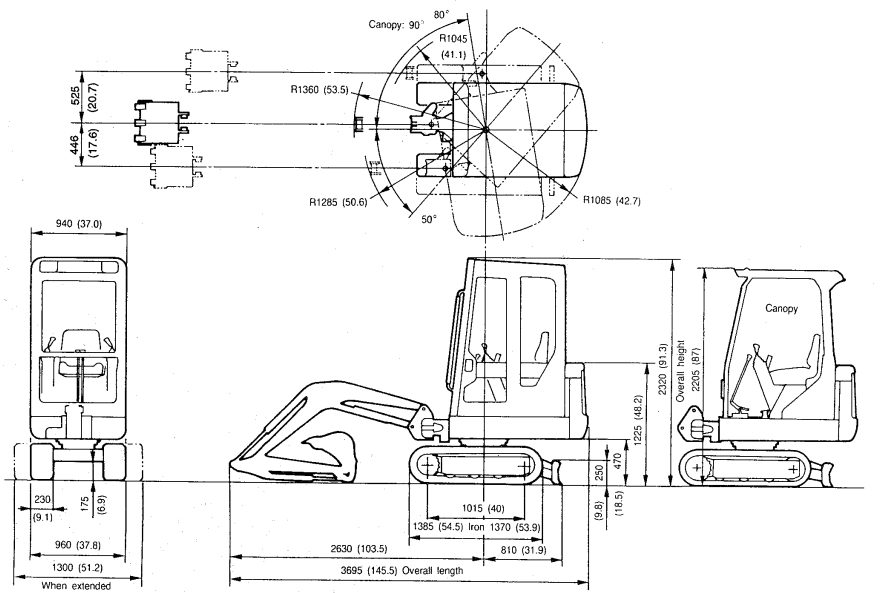
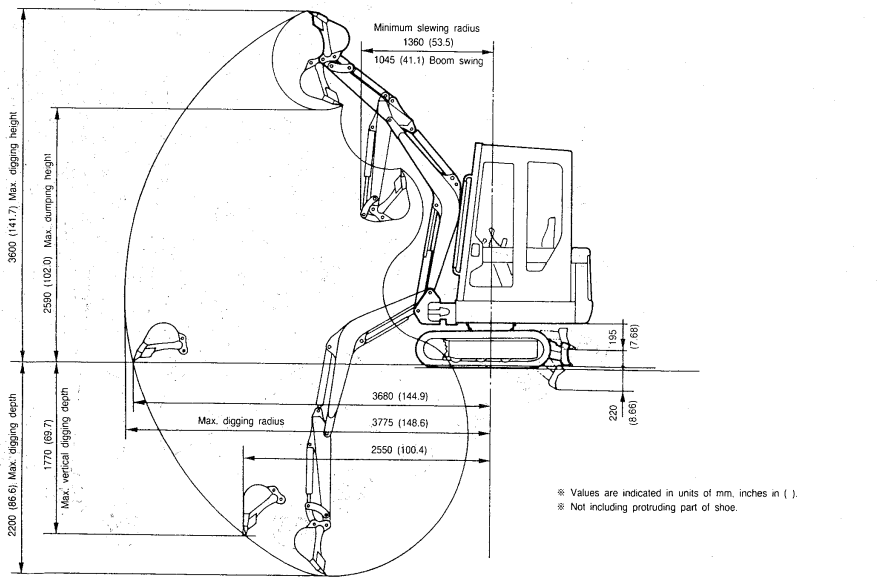
■ Serial Number: 1153182 ~ 1153427





※ Values are indicated in units of mm, inches in ( ).
※ Not including protruding part of shoe.

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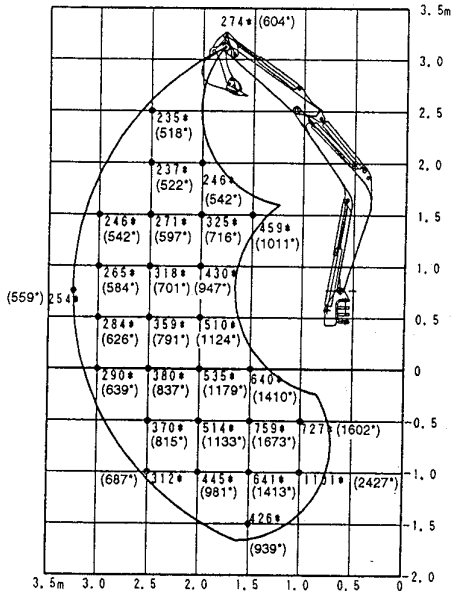
LIFTING CAPACITIES

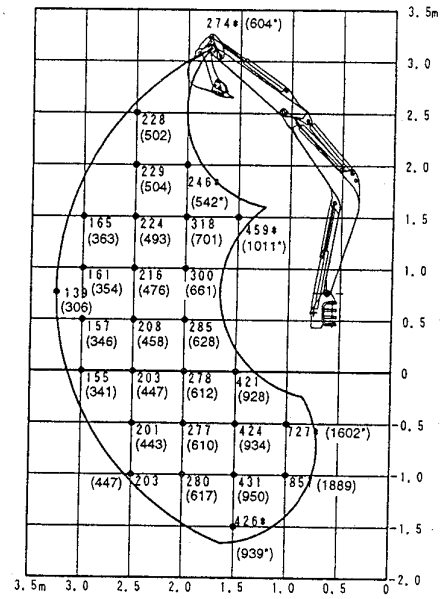
1. The numerical values in the charts indicate either 87% of the hydaulic lift capacity or 75% of the tipping load, whichever value is smaller. (*Marks indicate values limited by the hydraulic lift capacity.)
2. The load point is the bucket hinge pin, and the bucket posture is with the standard bucket completely retracted under the arm.
3. Units: kg (lbs.)

Rubber Crawler, Canopy, Standard Bucket, Standard Arm

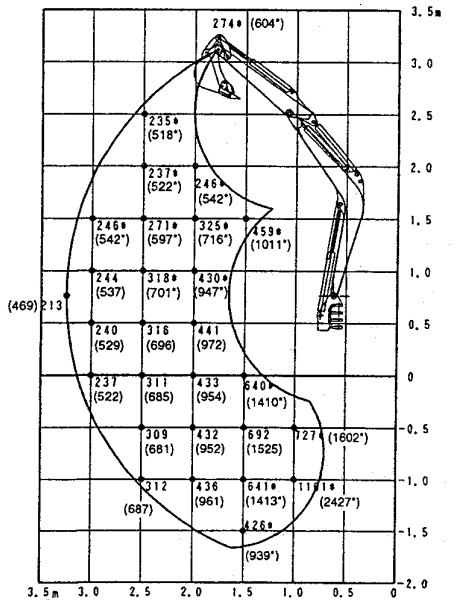
Over Front ; Dozer Blade Down



Over Front ; Dozer Blade Up

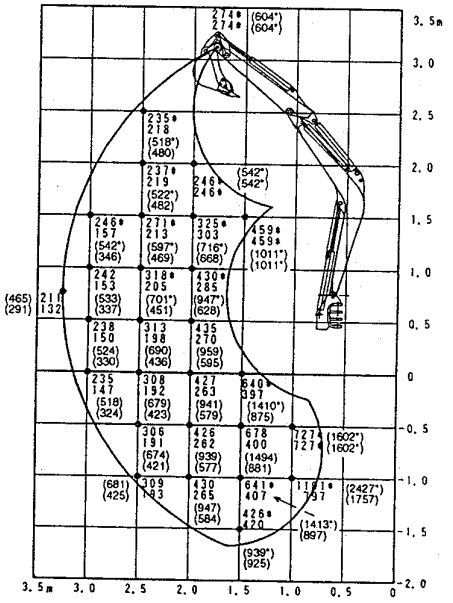


Over Rear



Over Side

Upper: Crawler Width 1300mm
Lower: Crawler Width 960mm



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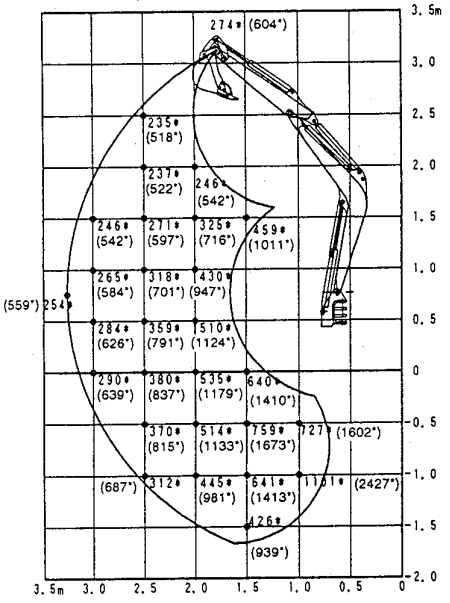
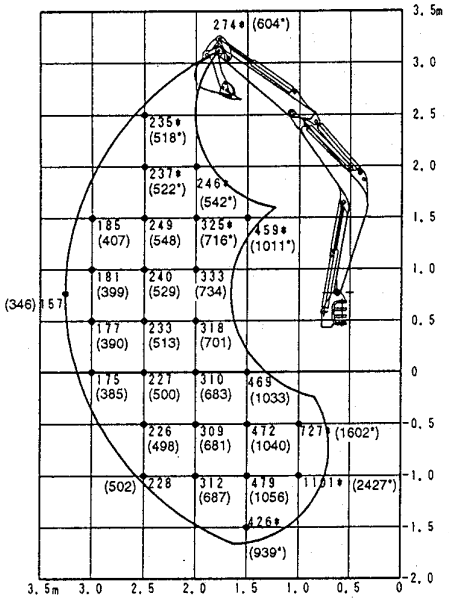
Rubber Crawler, Cab, Standard Bucket, Standard arm

Over Front ; Dozer Blade Down

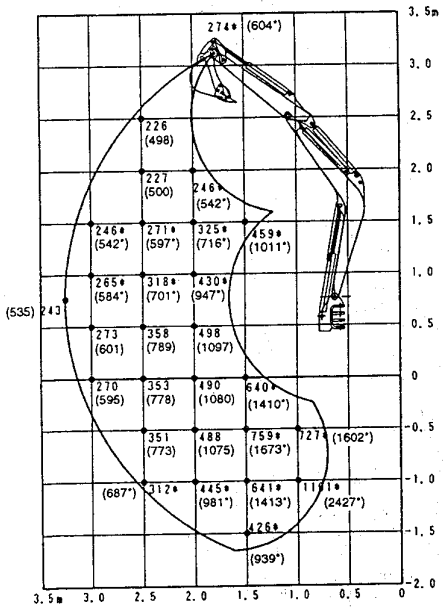


Over Front ; Dozer Blade Up

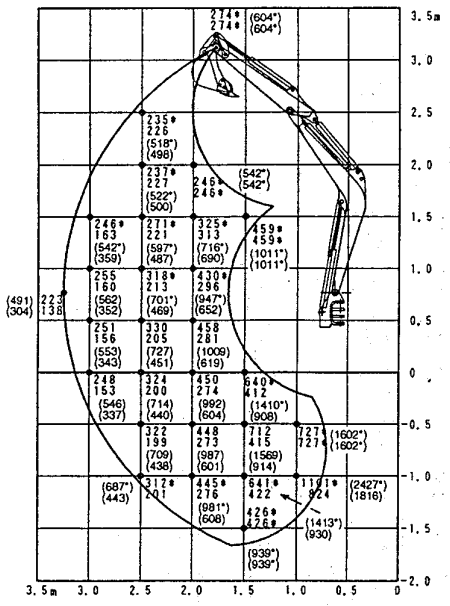


Upper: Crawler Width 1300mm
Lower: Crawler Width 960mm

Over Rear



Over Side



C3-020

SPECIFICATION TABLES

SPECIFICATIONS

Serial Number		1153001~	
Type		Canopy	Cab
Standard Bucket Capacity(SAE Rated)	(m^3)	0.037	←
Weight in Transport Condition	(kg)	1,500(1,550)	1,610(1,660)
Dimensions	(mm)		
Overall Length (in Transport Position)		3,695	←
Overall Width (in Transport Position)		960/1,300	←
Overall Height (in Transport Position)			
Serial Number: 1153001 ~ 1153181, 1153428 ~		2,270	2,320
Serial Number: 1153182 ~ 1153427		2,205	2,320
Minimum Ground Clearance		175	←
Minimum Height of Upper Machinery		470	←
Overall Width of Upper Machinery		940	←
Overall Width of Crawler		960/1,300	←
Overall Length of Crawler		1,385(1,370)	←
Minimum Slew Radius		1,360	←
Tail Swing Radius		1,085	←
Dozer Blade Width		960/1,300	←
Dozer Blade Height		250	←
Working Range	(mm)		
Maximum Digging Height		3,600	←
Maximum Digging Depth		2,200	←
Vertical Digging Depth		1,770	←
Maximum Digging Reach		3,775	←
Maximum Reach at Ground Level		3,680	←
Maximum Dumping Height		2,590	←
Bucket Offset: Right/Left		525/446	←
Dozer Blade Lift: Above/Below Ground		195/220	←
Performance			
Digging Force: Arm/Bucket	(kgf)	1,095/830	←
Slew Speed	(rpm)	8.8	←
Travel Speed	(km/h)	2.2/4.2	←
Traction Force	(kgf)	870	←
Gradeability	(degree)	20	←
Ground Pressure (JIS)	(kgf/cm^2)	0.294(0.308)	0.316(0.330)

* Values in ( ) are for models with steel crawler specifications.

SPECIFICATIONS OF DEVICES

Serial Number		1153001~
Engine		
Model		Yanmar 3TNA72L-UTBZ
Type		4-Cycle Water Cooled Diesel
Number of Cylinders–Bore×Stroke	(mm)	3–72×72
Total Displacement	(cc)	879
Compression Ratio		22.3
Dry Weight	(kg)	97
Performance		
Rated Output	(PS/rpm)	16/2,550
Maximum Torque	(kgf·m/rpm)	5.2/2,000
Maximum No-load R.P.M.	(rpm)	2,725
Minimum No-load R.P.M.	(rpm)	1,000
Specific Fuel Consumption	(g/PS·h)	200
Starter	(V–kW)	12–1.0
Generator	(V–A)	12–20
Battery	(V–A·h)	12–36(5HR)
Hydraulic Pump		
Model		YPT2A664A2H9–R400
Type		3-gear
Displacement	(cc/rev)	6.1+6.1+4.0
Delivery	(*l* /min)	15.6+15.6+10.2
Rated Pressure	(kgf/cm^2)	210
Weight	(kg)	5.4
Control Valve		
Model		KVS–31–9
Number of Circuits		9 circuits
Main Relief Valve Set Pressure	(kgf/cm^2@*l* /min)	195 @15.3(P1, P2), 195 @10.3(P3)
Port Relief Valve Set Pressure	(kgf/cm^2@*l* /min)	250 @5(B2, A3, B3, B8), 250 @ 15.3(A8)
Weight	(kg)	20
Control Valve (Sub)		
Model		YV179–000
Flow During Use	(*l* /min)	30(P), 5(A)
Reducing Valve Settings	(kgf/cm^2)	40
Weight	(kg)	6.8
Pilot Valve		
Model		TH40K1135A
Secondary Side Pressure	(kgf/cm^2)	0 ~ 40
Operating Angle : Single (Ports 1, 3)	(deg)	19
: Single (Ports 2, 4)	(deg)	25
Weight	(kg)	4.6

Serial Number		1153001~
Cylinders		
Boom		
Bore DiameterXRod Diameter	(mm)	55X30
Stroke	(mm)	410
Fully Retracted Length (Pitch)	(mm)	670
Cushion Mechanism		Rod Side
Weight	(kg)	12
Arm		
Bore DiameterXRod Diameter	(mm)	55X30
Stroke	(mm)	440
Fully Retracted Length (Pitch)	(mm)	660
Cushion Mechanism		—
Weight	(kg)	12
Bucket		
Bore DiameterXRod Diameter	(mm)	50X30
Stroke	(mm)	335
Fully Retracted Length (Pitch)	(mm)	555
Cushion Mechanism		—
Weight	(kg)	9
Swing		
Bore DiameterXRod Diameter	(mm)	60X35
Stroke	(mm)	370
Fully Retracted Length (Pitch)	(mm)	645
Cushion Mechanism		Rod Side
Weight	(kg)	14
Dozer Blade		
Bore DiameterXRod Diameter	(mm)	60X35
Stroke	(mm)	120
Fully Retracted Length (Pitch)	(mm)	372
Cushion Mechanism		—
Weight	(kg)	9
Spanner		
Bore DiameterXRod Diameter	(mm)	55X30
Stroke	(mm)	340
Fully Retracted Length (Pitch)	(mm)	536
Cushion Mechanism		—
Weight	(kg)	11

Serial Number		1153001~
Travel Motor		
Model: without / with P.B.		2DW09OFOOSA/2DW09GFOOSA
Type		Orbit Motor
Total Displacement: 1st / 2nd	(cc/rev)	396/198
Motor Displacement: 1st / 2nd	(cc/rev)	88/44
Reduction Gear Ratio		1/4.5
Spool Switching Pressure	(kgf/cm^2)	3.6~4.5
Parking Brake Torque	(kgfm)	45
Parking Brake Releace Pressure	(kgf/cm^2)	12
Amount of Reduction Gear Lubricant	(l)	0.4
Weight	(kg)	26
Slew Motor		
Model: without / with P.B.		2-200CO4P5-E/2-200EOP5-E
Type		Orbit Motor
Total Displacement	(cc/rev)	195
Relief Valve Set Pressure	(kgf/cm^2@l /min)	115@11
Parking Brake Torque	(kgfm)	16
Parking Brake Releace Pressure	(kgf/cm^2)	10
Weight: without / with P.B.	(kg)	22/24
Swivel Joint		
Model		YV-7116
Weight	(kg)	13

WEIGHT TABLES

UNIT WEIGHT (Dry Weight)

Units: kg

Serial Number	1153001~	
Type	Canopy	Cab
Upper Machinery	770	880
Engine	97	←
Radiator	5	←
Hydraulic Pump	5.4	←
Hydraulic Tank	27	←
Fuel Tank	13	←
Control Valve	20	←
Control Valve (Sub)	6.8	←
Pilot Valve	4.6	←
Slew Motor: without / with P.B.	22/24	←
Canopy / Cab	83	181
Counter Weight	18	←
Side Protector [R]	17	←
Side Protector [L]	18	←
Swing Bracket	26	←
Swing Cylinder	14	←
Lower Machinery	515(565)	←
Swivel Joint	13	←
Slew Bearing	18	←
Spanner Cylinder	11	←
Crawler Belt	50(78)	←
Travel Motor	26	←
Track Roller	4	←
Idler	14	←
Sprocket	4.9	←
Track Adjuster	5.2	←
Dozer Blade	61(54)	←
Dozer Blade Cylinder	9	←
Hoe Attachment	170	←
Boom	49	←
Arm	25	←
Bucket: Standard 450mm	33	←
Boom Cylinder	12	←
Arm Cylinder	12	←
Bucket Cylinder	9	←

* Values in ( ) are for models with steel crawler specifications.

FLUID CAPACITIES

Serial Number		1153001~
Hydraulic Oil : Tank Level / Total System	(*l*)	21/30
Engine Oil : Upper Limit / Lower Limit	(*l*)	2.4/1.4
Travel Reduction Gear	(*l*)	0.4×2
Track Roller	(cc)	60×6
Idler	(cc)	45×2
Fuel Tank	(*l*)	19.5
Engine Cooling System	(*l*)	3.5